Journal of Critical Care 38 (2017) 304–318

Contents lists available at ScienceDirect

Journal of Critical Care

journal homepage: www.jccjournal.org

Evidence-based guidelines for the use of tracheostomy in critically ill patients☆

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ARTICLE INFO

Keywords:
Tracheostomy
Clinical guidelines
Consensus
Percutaneous
Critical care
Intensive care unit

ABSTRACT

Objectives: To provide evidence-based guidelines for tracheostomy in critically ill adult patients and identify areas needing further research.
Methods: A taskforce composed of representatives of 10 member countries of the Pan-American and Iberic Federation of Societies of Critical and Intensive Therapy Medicine and of the Latin American Critical Care Trial Investigators Network developed recommendations based on the Grading of Recommendations Assessment, Development and Evaluation system.
Results: The group identified 23 relevant questions among 87 issues that were initially identified. In the initial search, 333 relevant publications were identified, of which 226 publications were chosen. The taskforce generated a total of 19 recommendations, 10 positive (1B, 3; 2C, 3; 2D, 4) and 9 negative (1B, 8; 2C, 1). A recommendation was not possible in 6 questions.
Conclusions: Percutaneous techniques are associated with a lower risk of infections compared with surgical tracheostomy. Early tracheostomy only seems to reduce the duration of ventilator use but not the incidence of

☆ Spanish version of this article available at Medicina Intensiva, 2017, http://dx.doi.org/10.1016/j.medin.2016.12.001.

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http://dx.doi.org/10.1016/j.jcrc.2016.10.009

pneumonia, the length of stay, or the long-term mortality rate. The evidence does not support the use of routine bronchoscopy guidance or laryngeal masks during the procedure. Finally, proper prior training is as important or even a more significant factor in reducing complications than the technique used.

1. Introduction

Tracheostomy is among the oldest known surgical procedures and one of the most widely used in intensive care units (ICUs) [1]. It is primarily used in patients with respiratory failure requiring mechanical ventilation (MV). The indications, optimal timing, and ideal technique for tracheostomy are subjects of significant controversy and represent clinical challenges that we will likely face more frequently given the increasing use of MV [2,3]. There are currently no comprehensive evidence-based clinical guidelines, only recommendations and consensus documents that are limited to percutaneous tracheostomy (PT) [4,5].

The objective of this document is to provide management guidelines based on the available scientific evidence and the consensus of a group of international experts from 10 countries, including Latin American countries, Spain, and the United States, members of the Panamerican and Iberic Federation of Societies of Critical and Intensive Therapy Medicine (Federación Panamericana e Ibérica de Sociedades de Medicina Crítica y Terapia Intensiva [Federation of Societies of Critical and Intensive Therapy Medicine; FEPIMCTI]), and members of the Latin American Critical Care Trial Investigators Network (LACCTIN). An additional goal is to identify areas in which further studies are needed. It should be noted that the recommendations in this guide refer primarily to adult patients (≥18 years) in critical condition who are hospitalized in ICUs; this document does not address the needs of pediatric patients.

1.1. Definitions

Tracheotomy refers to the surgical opening of the anterior wall of the trachea, whereas a tracheostomy entails the creation of a similar opening, followed by the fixation of the trachea to the skin of the neck. The latter generally aims to establish a more definitive opening. The 2 terms are currently used interchangeably [1].

Surgical tracheostomy (ST) involves the dissection of the pretracheal tissues and the insertion of a tracheostomy cannula while directly viewing the trachea. It can be performed in an operating room or at the patient's bedside. Percutaneous tracheostomy involves the introduction of a tracheal cannula by means of blunt dissection of the pretracheal tissues, using Seldinger's technique as a guide. There is no consensus in the literature with respect to what is considered an early or late tracheostomy. This is important because it may explain some of the inconsistencies in the results from different studies.

1.2. Indications and contraindications for elective tracheostomy

The main indications for tracheostomy include protection and access to the airway to remove secretions, prolonged MV, upper airway obstruction, and reduction of dead space to facilitate ventilatory weaning. In emergency clinical scenarios, tracheostomy has few indications because cricothyroidotomy can be used to safeguard the airway faster and with less risk of immediate complications. In this setting, the only true indication is for patients with closed-neck trauma and fracture of the thyroid or cricoid cartilage [6].

The development of new and improved instruments and the standardization of techniques have reduced the risks such that there are practically no absolute contraindications. Relative contraindications [7–9] are listed below:

- Coagulation disorders
- Short neck (neck circumference >46 cm, with a distance between the cricoid cartilage and the sternal notch <2.5 cm)
- Obesity
- Enlarged thyroid glands or isthmus
- Infection of the soft tissues in the neck
- Inability to extend the neck
- Presence of pulsatile vessels in the region
- Local malignancy
- History of cervical surgery or tracheostomy
- History of radiotherapy in the cervical region (within the last 4 weeks)
- High ventilatory support required (fraction of inspired oxygen >70%, positive end-expiratory pressure >10 cm H_2O)

The contraindications listed here can be managed and overcome by a professional with experience in the procedure. There are reports of successful tracheostomies performed in patients with prior tracheostomies, obesity, or coagulation disorders [10,11].

2. Methods

2.1. Pan-American and Iberic FEPIMCTI

The FEPIMCTI is an organization of more than 15 national societies of critical and intensive care medicine that are dedicated to advancing the specialty in the member countries in the Americas and the Iberian Peninsula.

2.2. Taskforce

The Executive Committee of the FEPIMCTI assigned the president-elect the responsibility of creating a taskforce composed of representatives of the member countries. Team members were designated by the respective societies of each of the 10 countries that agreed to participate in the project. The 29-team members in the final group were divided into 1 team leader, 4 coordinators, a secretary, and a librarian, and the remaining 22 people formed 11 working pairs. After the chronology, logistics, and working methods were established, the group selected 23 relevant questions among 87 issues that were initially identified. The questions were developed using the elements described by the acronym PICO: P, patients; I, intervention; C, comparison; and O, outcome.

2.3. Literature search and review

Literature research experts on the FEPIMCTI taskforce designed the search strategy. It was conducted using the keywords of each question and searching within the headers and subheaders of the medical subjects in the National Center for Biotechnology Information database, such as “tracheostomy,” “critical care,” “percutaneous,” “complications,” “indications,” “outcome,” and “ultrasonography”. The sources used included the Latin American and Caribbean Literature in Health Sciences database; the Cochrane Library: *Cochrane Database of Systematic Reviews*, the *Cochrane Central Register Of Controlled Trials*, the Cochrane BVS, and the *Database of Abstracts of Reviews of Effects*; EMBASE; MEDLINE through PUBMED; the *National Health Service Economic Evaluation Database*; and the National Institute for Health and Care Excellence database.